

Spot Safety Project Evaluation

Project Log # 200505111

Spot Safety Project # 02-97-255

Spot Safety Project Evaluation of installed guardrail on retrofitted bridge #24-050 at all four approaches at the Pitt/Craven County Line on NC 43.

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Samuel D. Coleman, EI

Traffic Safety Project Engineer

02-22-2006
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-97-255 - Retrofit bridge #24-050 and install guardrail on all four approaches at the Pitt/Craven County Line on NC 43.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis of the treatment data has been completed to measure the effectiveness of the spot safety improvement. Additional analysis methods were not utilized for this evaluation because a suitable comparison group was unattainable. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location was to retrofit bridge #24-050 and install guardrail on all four approaches at the Pitt/Craven county line. NC 43 is a two-lane, 55-mph facility without left turn lanes. The initial crash analysis for this intersection was completed from August 1, 1991 to July 31, 1997. There were a total of 4 crashes including 3 run off road crashes which resulted in 2 Fatafs, 2 Class A and 1 Class B injury. The stated reason for this improvement was there was no protection for vehicles that run off the roadway approaching the bridge. The final completion date for the guardrail installation along the subject road was on May 1, 2001 at a cost of \$60,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from April 2001 through June 2001. The before period consisted of reported crashes from April 1, 1997 through March 31, 2001 (4 years). The after period consisted of reported crashes from July 1, 2001 through June 30, 2005 (4 Years). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed. The analysis consisted of crashes that occurred along NC 43 at the Pitt/Craven county line, 1000' on either side of bridge #24-050 with a 0' y-line (See diagram 1).

The following data table depicts the Naive Before and After Analysis for the above information. Please note that Ran Off Road Crashes were the target crashes for the applied countermeasure. The crash types considered are as follows: Ran Off Road-Left, Ran Off Road-Right, Ran Off Road-

Straight, Overturn/Rollover, Fixed Object, Head-On; Sideswipe, Same Direction; Sideswipe, Opposite Direction.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	3	4	33.3
Total Severity Index	3.5	1.0	-71.2
Target Crashes	1	1	0.0
Target Severity Index	8.4	1.0	-88.1
Volume	4400	5100	15.9
<u>Treatment Injury Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	0.0
Class A	0	0	0.0
Class B	1	0	-100.0
Class C	0	0	0.0
Property Damage Only	2	4	100.0
<u>Target Injury Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	0.0
Class A	0	0	0.0
Class B	1	0	-100.0
Class C	0	0	0.0
Property Damage Only	0	1	100.0
<i>Crashes over embankment</i>	1	0	-100.0
<i>Crashes into guardrail</i>	0	1	100.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 33.3 percent decrease in Total Crashes, a 0.0 percent change in Target Crashes, and a 15.9 percent increase in Average Daily Traffic (ADT). The Treatment Injury Information resulted in a 100.0 percent decrease for Class B, and a 100.0 percent increase for Property Damage Only. The Target Injury Information resulted in a 100.0 percent decrease in Class B injuries and a 100.0 percent increase in Property Damage Only crashes. The before period ADT year was 1999 and the after period ADT year was 2003.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 33.3 percent decrease in Total Crashes and a 0.0 percent change in Target Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and no change in the number of Target Crashes from the before to the after period.

There is one crash in the before and one crash in the after period that are target crashes. Table 1 shows the severity of a crash with and without the guardrail. Looking at these two crashes the guardrail did its intended function of keeping the vehicle on the road and slowing it down as safely as possible in the event of a crash.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.

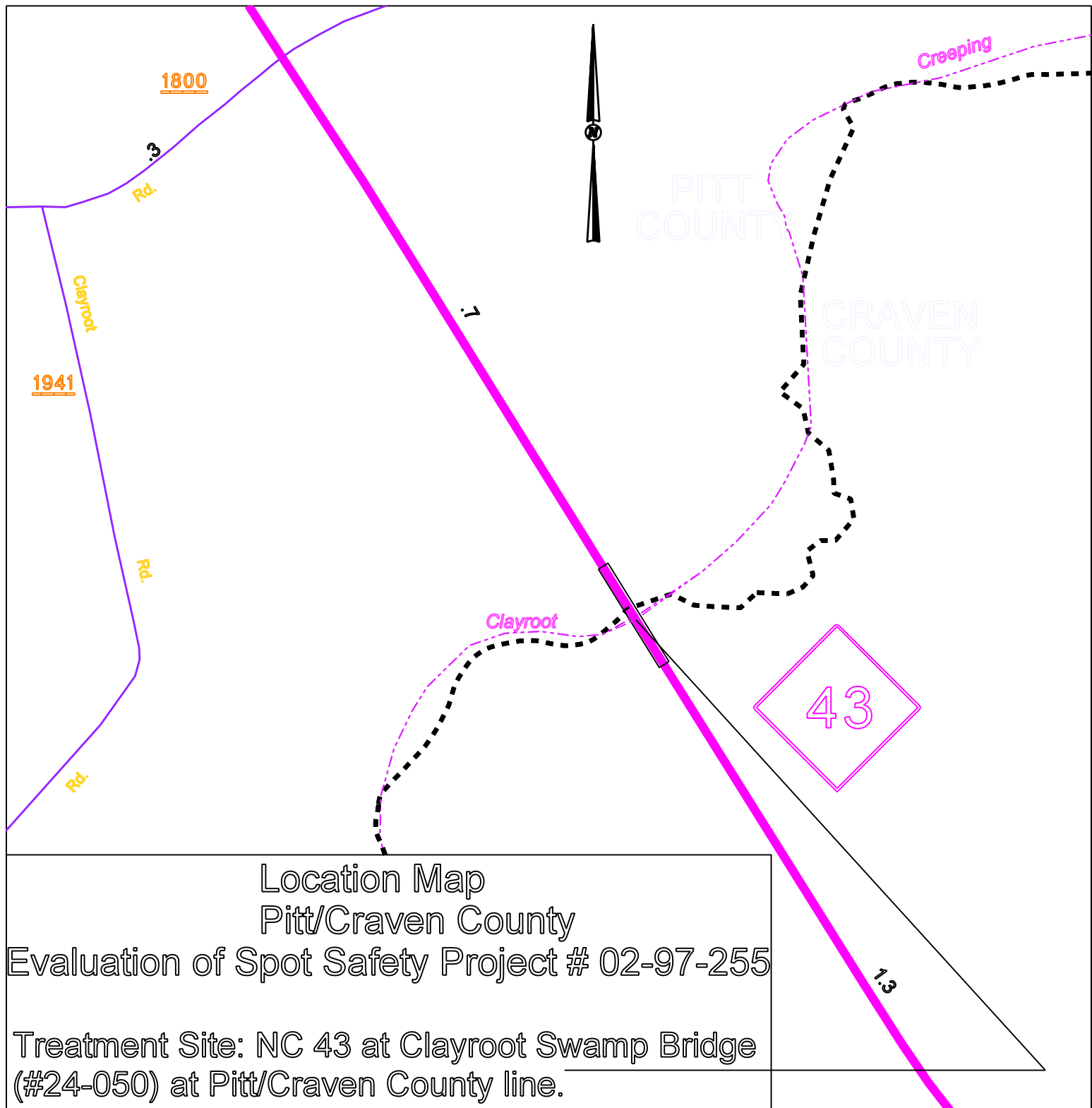
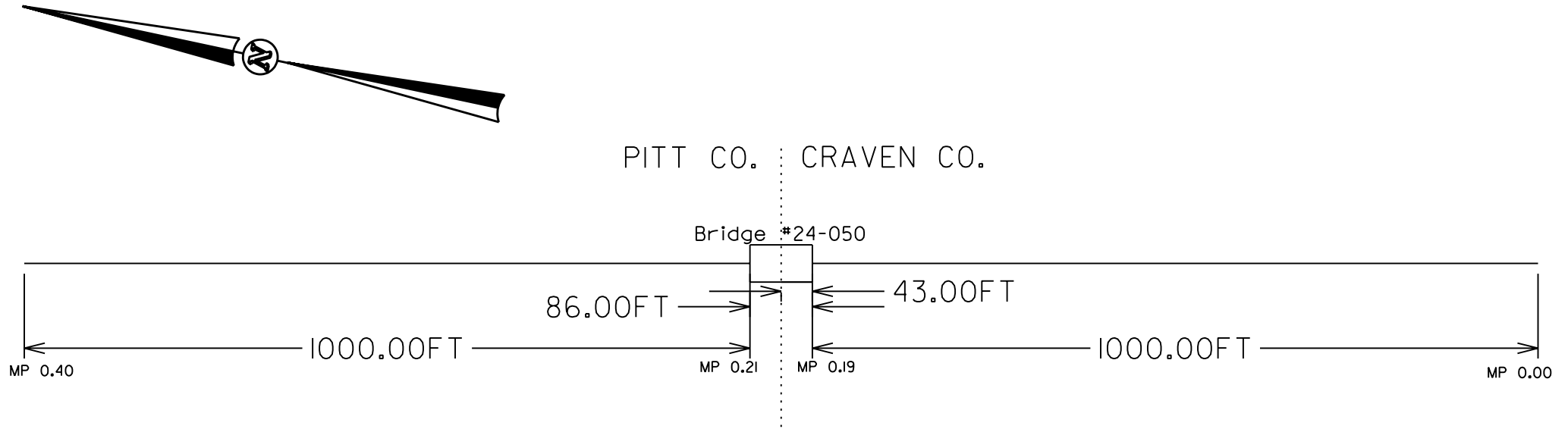


DIAGRAM I



Treatment Site Photos taken on November 14, 2005



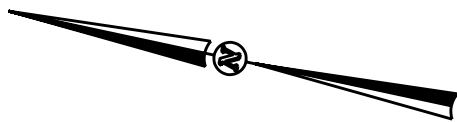
Traveling North on NC 43 (deep ditch on right of guardrail)



Traveling North on NC 43



Traveling South on NC 43



Treatment Site - TotalCrashes
Before Period
April 1, 1997 - March 31, 2001
(4 years)
Pitt/Craven County

LEGEND

	right turn vehicle		left turn vehicle		0 mph or less		P PEDESTRIAN
	right turn vehicle		left turn vehicle		10 mph or less		B BICYCLE
	right turn vehicle		left turn vehicle		20 mph or less		T TRAIN
	right turn vehicle		left turn vehicle		30 mph or less		A ANIMAL
	right turn vehicle		left turn vehicle		40 mph or less		• DRIVER AT FAULT
	right turn vehicle		left turn vehicle		50 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		60 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		70 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		80 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		90 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		100 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		110 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		120 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		130 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		140 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		150 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		160 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		170 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		180 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		190 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		200 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		210 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		220 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		230 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		240 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		250 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		260 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		270 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		280 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		290 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		300 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		310 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		320 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		330 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		340 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		350 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		360 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		370 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		380 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		390 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		400 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		410 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		420 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		430 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		440 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		450 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		460 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		470 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		480 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		490 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		500 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		510 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		520 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		530 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		540 mph or less		D DRIVER
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	right turn vehicle		left turn vehicle		560 mph or less		D DRIVER
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	right turn vehicle		left turn vehicle		580 mph or less		D DRIVER
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	right turn vehicle		left turn vehicle		600 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		610 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		620 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		630 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		640 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		650 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		660 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		670 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		680 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		690 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		700 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		710 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		720 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		730 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		740 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		750 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		760 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		770 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		780 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		790 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		800 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		810 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		820 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		830 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		840 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		850 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		860 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		870 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		880 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		890 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		900 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		910 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		920 mph or less		D DRIVER
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	right turn vehicle		left turn vehicle		940 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		950 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		960 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		970 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		980 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		990 mph or less		D DRIVER
	right turn vehicle		left turn vehicle		1000 mph or less		D DRIVER

◀ PITT CO.

CRAVEN CO. ▶

County Line

A ← D ①

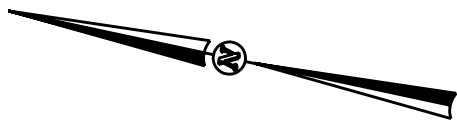
③

② → D A

Bridge #24-050

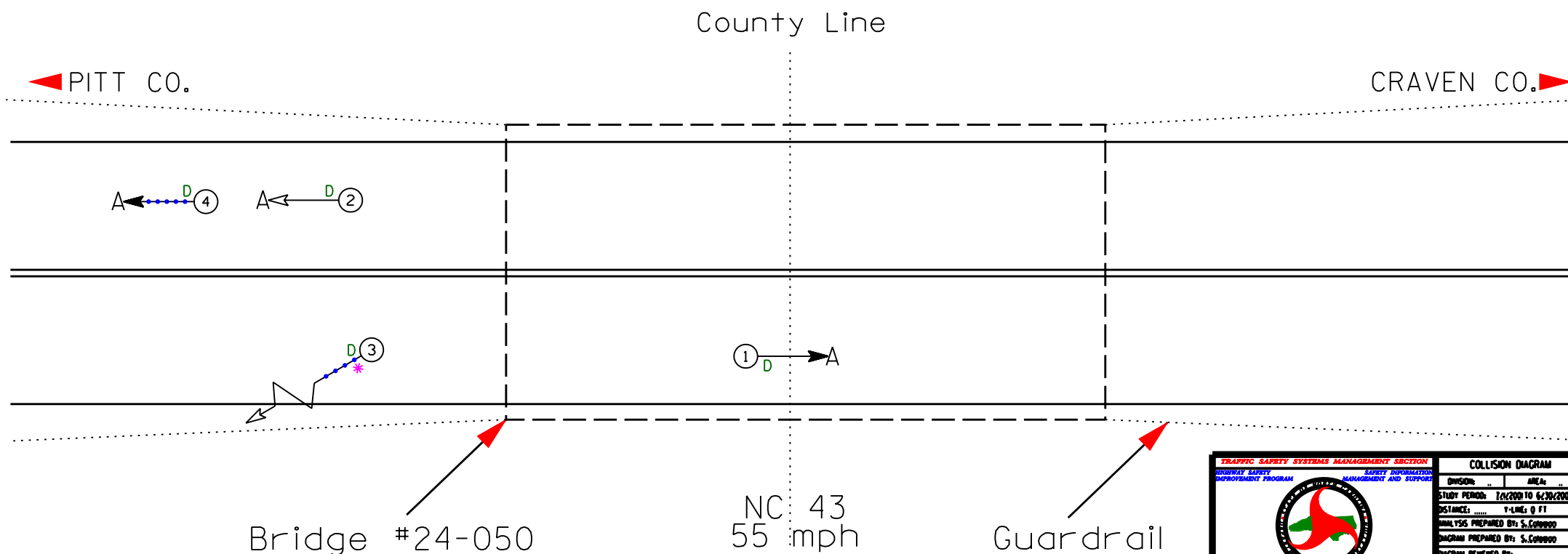
NC 43
55 mph

TRAFFIC SAFETY SYSTEMS MANAGEMENT SECTION		COLLISION DIAGRAM	
HIGHWAY SAFETY IMPROVEMENT PROGRAM	SAFETY INFORMATION MANAGEMENT AND SUPPORT	DIVISION	AREA
		STUDY PERIOD:	4/1/97 TO 3/31/01
		DISTANCE:	T-MILE: 0.11
		ANALYSIS PREPARED BY:	S. COMBOD
		DIAGRAM PREPARED BY:	S. COMBOD
SAFETY EVALUATION		SCALE:	NOT TO SCALE
BEFORE CHAOSORAN		DATE:	NOVEMBER 2005
		LOG NUMBER:	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			



Treatment Site - Total Crashes
After Period
July 1, 2001 - June 30, 2005
(4 years)
Pitt/Craven County

LEGEND			
	moving vehicle		single
	pedestrian		turning
	moving vehicle		crossing
	moving vehicle		side-swipe
	moving vehicle		out of control
	moving vehicle		night
	moving vehicle		fatigue
	moving vehicle		9 mph or less
	moving vehicle		10 mph to 19
	moving vehicle		20 mph to 29
	moving vehicle		30 mph to 39
	moving vehicle		40 mph to 49
	moving vehicle		50 mph to 59
	moving vehicle		60 mph to 69
	moving vehicle		70 mph or more
	moving vehicle		speed limit
	moving vehicle		divided highway
	moving vehicle		grade change
	moving vehicle		P PEDESTRIAN
	moving vehicle		B BICYCLE
	moving vehicle		T TRUCK
	moving vehicle		A ANIMAL
	moving vehicle		DRIVER AT FAULT
	moving vehicle		D DRY
	moving vehicle		W WET
	moving vehicle		I ICE OR SNOW



TRAFFIC SAFETY SYSTEMS MANAGEMENT SECTION		COLLISION DIAGRAM	
HIGHWAY SAFETY IMPROVEMENT PROGRAM	SAFETY INFORMATION MANAGEMENT AND SUPPORT	DIVISION: _____	AREA: _____
		STUDY PERIOD: 7/1/2001 TO 6/30/2005	
		DISTANCE: _____	T-LENGTH: 0 FT
		ANALYSIS PREPARED BY: S. CORREDO	
		DIAGRAM PREPARED BY: S. CORREDO	
SAFETY EVALUATION		SCALE: NOT TO SCALE	DATE: FEBRUARY 2006
AETER GUARDRAIL		LOG NUMBER: _____	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			